BOARD OF COUNTY COMMISSIONERS
AGENDA ITEM SUMMARY

Meeting Date: **Sept. 20, 2006/Marathon**

Division: **BOCC - DISTRICT 5**

Bulk Item: Yes ___ No _x_

Department: **Comm. Glenn Patton**

Staff Contact Person: **Donna Hanson**

AGENDA ITEM WORDING: Approval of a resolution of the Key Largo Wastewater Treatment District, Key Largo, Florida requesting payment by Monroe County of mitigation fees required by county ordinance in connection with further clearing of the District's central wastewater treatment plant site.

ITEM BACKGROUND: See attached Vegetation Survey and Mitigation Plan.

PREVIOUS RELEVANT BOCC ACTION:

CONTRACT/AGREEMENT CHANGES:

STAFF RECOMMENDATIONS:

TOTAL COST: $423,796.56 **BUDGETED:** Yes _x_ No ___

COST TO COUNTY: $423,796.56 **SOURCE OF FUNDS:** 304 fund

REVENUE PRODUCING: Yes ___ No ___ **AMOUNT PER MONTH**____ **Year** ____

APPROVED BY: County Atty ___ OMB/Purchasing ____ Risk Management ____

DOCUMENTATION: Included _x_ Not Required_____

DISPOSITION:_____ **AGENDA ITEM #**_____

Revised 8/06

RESOLUTION NO. 29-08-06

A RESOLUTION OF THE KEY LARGO WASTEWATER TREATMENT DISTRICT, KEY LARGO, FLORIDA REQUESTING PAYMENT BY MONROE COUNTY OF MITIGATION FEES REQUIRED BY COUNTY ORDINANCE IN CONNECTION WITH FURTHER CLEARING OF THE DISTRICT'S CENTRAL WASTEWATER TREATMENT PLANT SITE.

WHEREAS, the Key Largo Wastewater Treatment District ("District") intends to clear an additional 1.59 acres of land at the District's central wastewater treatment plant site located at MM 100.5, Key Largo; and

WHEREAS, this clearing will permit the construction of the final portions of the District's central wastewater treatment plant, with a capacity of 2.25 million gallons/day, to serve the entire District;

WHEREAS, pursuant to Monroe County ("County") Land Development Regulations, the additional clearing will result in a mitigation payment requirement of $424,000, as set forth in the attached KLWTD Vegetation Survey and Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED BY THE KEY LARGO WASTEWATER TREATMENT DISTRICT BOARD OF KEY LARGO, FLORIDA, THAT:

Section 1. The County has established a practice of paying such mitigation payments directly to the County Land Authority's dedicated mitigation fund.

Section 2. Therefore, the District respectfully requests that the County make the mitigation payment to the mitigation fund.

[INTENTIONALLY LEFT BLANK]

The foregoing RESOLUTION NO. 29-08 06 was offered by Commissioner Bauman, who moved its approval. The motion was seconded by Commissioner Brooks, and being put to a vote the result was as follows:

	AYE	NAY
Commissioner Gary Bauman	X	____
Commissioner Charles Brooks	X	____
Commissioner Andrew Tobin	____	Absent____
Commissioner Norman Higgins	X	____
Chairman Claude Bullock	X	____

The Chairman thereupon declared Resolution No. 29-08-06 duly passed and adopted the 9th day of August 2006.

KEY LARGO WASTEWATER TREATMENT DISTRICT GOVERNING BOARD

By Claude M. Bullock
Claude Bullock, Chairman

Attest:

By Carol Walker
Carol Walker, Board Clerk

Approved as to form and content:

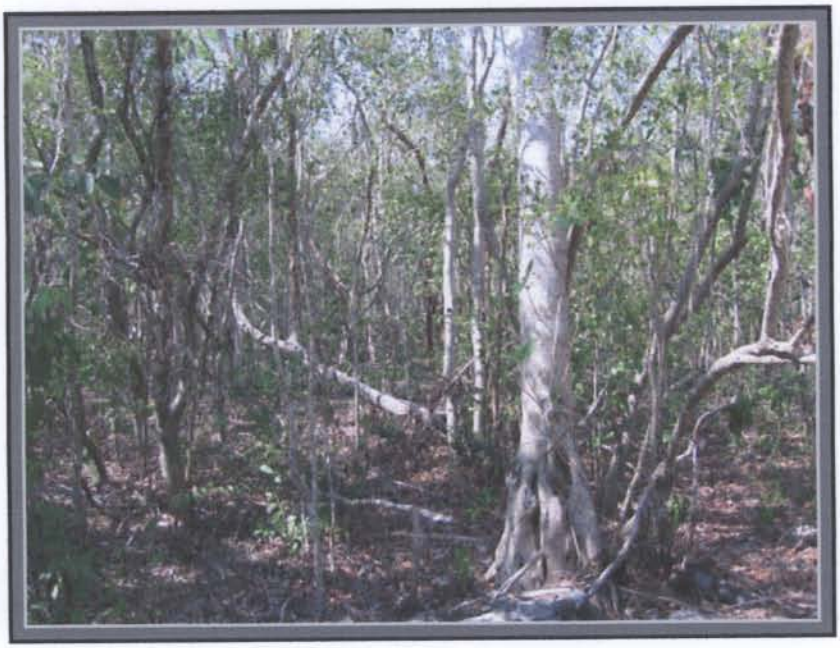
By Thomas W. Willson
District Counsel

VEGETATION SURVEY and MITIGATION PLAN

KEY LARGO WASTEWATER TREATMENT PLANT

MILE MARKER 100.5

KEY LARGO, MONROE COUNTY, FLORIDA



Prepared by

Consulting Engineering and Science, Inc.
8925 S.W. 148th Street, Suite 100
Miami, Florida 33176

July 2006

INTRODUCTION

The Key Largo Wastewater Treatment District (KLWTD) operates the wastewater collection and treatment facilities that serve the island of Key Largo. The mission of the KLWTD is to provide for sanitary treatment and disposal of wastewater, and is an integral component of the larger state and federal initiative to restore the Everglades and Florida Bay ecosystem and reduce nutrient loading in nearshore waters. The island of Key Largo includes over 13,000 individual parcels of land, and it is the goal of the KLWTD to have centralized wastewater collection and treatment in place to serve all commercial and residential interests on Key Largo by the year 2010. In order to accommodate the wastewater treatment needs of service area, an expansion of the facility is needed.

The Key Largo Wastewater Treatment District (KLWTD) is proposing an expansion of the regional wastewater treatment facility located at Mile Marker 100.5, Key Largo, to accommodate the ultimate needs of the wastewater service area which includes all of Key Largo. In order to accomplish this expansion, an area or hardwood hammock 1.59 acres in size will need to be cleared.

The KLWTD central treatment facility is located at Mile Marker 100.5, and consists of a parcel of land approximately 21 acres in size, including an existing cleared area of approximately 2.6 acres (Figure 1). The initial clearing of this area of hardwood hammock was conducted for the construction of the first phase of the wastewater facility, and was previously authorized by Monroe County. The remaining 18.4 acres of the property is vegetated with hardwood hammock and is part of a larger forested area known as Newport Hammocks. The hardwood hammock on the KLWTD has been previously determined to be High Quality pursuant to the Monroe County Land Development Regulations (LDR's).

The study area includes an area totaling 1.59 acres (69,260 sq.ft.) that has been proposed to be cleared for the expansion of the wastewater facility, and is located adjacent to the eastern

boundary of the existing cleared portion of the KLWTD (Figure1). The majority of this area is hardwood hammock with the exception of an unpaved access road approximately 20' in width that runs along the southern portion of the proposed clearing (Figure 4). The vegetation on the study area is medium-aged hardwood hammock estimated to be 40-60 year old growth. The species composition is typical of hardwood hammocks on Key Largo, and includes a diverse array of plant species of West Indian origin (Figure 3).

The LDR's specify that, to the maximum extent practicable, development shall be sited so as to preserve all listed threatened, endangered, commercially exploited, and regionally important native plant species and all native trees with a diameter at breast height (DBH) of greater than four inches (protected plants). In those instances where avoidance of such species is not possible, then the loss of such species shall be mitigated pursuant to Monroe County mitigation standards. These standards require that the removal of any protected plant species shall require payment to the Monroe County Environmental Land Management and Restoration Fund in an amount sufficient to replace each removed plant or tree on a two to one (2:1) basis. Revenues deposited in this fund shall be used by Monroe County for restoration and management activities of public resource protection and conservation lands. The mitigation fee shall be based on the replacement cost of the specific plants and trees, and shall be based on a price schedule maintained by Monroe County.

In order to determine the number of protected plant species that will be potentially impacted by the proposed development and the mitigation required to offset the unavoidable impacts associated with the proposed project, a vegetation survey and mitigation plan was completed for 1.59 acre study area. The vegetation survey was completed using a vegetative sampling methodology that is statistically sound, biologically defensible, and specifically tailored to the KLWTD property. The objective of the vegetation survey is to document the distribution and abundance of protected trees on the property, and express this information in a statistic that represents the number of protected plants per unit area. Having a statistic describing the density

of protected plants will allow a simple and straightforward estimation of the project impacts and mitigation requirements.

BACKGROUND

Sampling with quadrats (plots of a standard size) is a common technique used to quantify forest species composition. A quadrat delimits an area in which vegetation cover can be estimated, plants counted, or species listed. Since plants often grow in clumps, long, narrow plots often include more species than square or round plots of equal area. However, accuracy may decline as the plot lengthens because, as the perimeter increases, the surveyor must make more subjective decisions about the placement of plants inside or outside the plot.

An important factor in choosing the size of a sampling unit (quadrat) is to have it large enough to include a representative number of trees but small enough so that the time required for measurement is not excessive. A quadrat should be large enough to include significant numbers of individuals, but small enough so that plants can be separated, counted and measured without duplication or omission of individuals. The appropriate size for a quadrat depends on the items to be measured and the desired accuracy of the survey.

For the present survey, it was determined *a priori* that a minimum of 25 % of the total forest cover in the study area would be sampled or 25% of 69,260 square feet (1.59 acres). Thus, a quadrat size and configuration totaling 17,315 square feet within the study area was designed and used to sample forest vegetation.

METHODOLOGY

The hardwood hammock habitat the KLWTD study area was sampled to determine tree species composition and size class distribution using the following sampling methodology (Figure 2):

- A minimum of 25% of the total area of hardwood hammock was sampled (25% of 1.59 acres = 17,315 sq.ft.);
- Square quadrats 2,500 sq. ft. in area (50' x 50') were used to sample plant species;
- Seven (7) quadrats were established and sampled to reach the desired 25% sampling area (7 x 2,500 sq. ft. = 17,500 sq. ft; 25.3% of total study area);
- Quadrats were located within the forest using a stratified design with plots placed along the approximate mid-points of a series of transects established within the study area;
- Roads, paths and clearings were purposefully avoided when locating quadrats to maintain the vegetative samples in intact forest, resulting in a small overestimate of protected plant density over the study area; and
- All protected plant species within each quadrat were identified to species and assigned a height class that corresponds to corresponding nursery pot size to allow calculation of replacement costs established by the Monroe County mitigation standards;

Data Collection

The sampling quadrats described above were located placed in the field and the center point established using a desktop Geographic Information System (GIS). Within these established quadrats, all protected tree species were identified to species and marked with biodegradable tree markers (either marking crayon or flagging tape). Data recorded for protected plants included species and size class for mitigation replacement based on guidelines established by Monroe County (Table 1). Plant sampling was conducted during May 8-13, 2006.

Table 1. Tree height and corresponding nursery pot size to determine mitigation requirements for trees impacted through construction of the proposed redevelopment project at the KLWTD.

Tree Height	0-3'	3-6'	6-10'	10 +
Pot Size	3 Gallon	7 Gallon	10 Gallon	25 Gallon

Data for protected plants was summarized by quadrat and pooled to estimate overall protected tree density on the study area. Data from the quadrats was converted to an estimate of estimated protected plants using the following formula:

TOTAL PROTECTED PLANTS SAMPLED / TOTAL AREA SAMPLED
= ESTIMATED PROTECTED PLANTS PER SQUARE FOOT

RESULTS

Protected Plant Density

A total of 721 protected plants of 21 species were identified on the seven quadrats sampled over a total area of 17,500 square feet (Appendix 1). Inkwood was the most abundant protected plant with a total of 386 individuals recorded; the vast majority of these individuals (365, 95%) were seedlings that occurred in dense patches in close proximity to adult seed trees (Figure 5). Considering non-seedling trees, Gumbo limbo was the most common protected tree encountered in the forest, with Wild Tamarind, Poisonwood, Mahogany, Pigeon Plum, and Black Ironwood, Jamaica dogwood, and Pale Lidflower (Spicewood) also well represented.

Protected plant density was estimated as follows:

TOTAL PROTECTED PLANTS SAMPLED = 721
TOTAL AREA SAMPLED TRACT 4-B = 17,500 SQ. FT.
721 / 17,500 SQ.FT. = 0.0412 PROTECTED PLANTS PER SQ.FT.
0.0412 x 43,560 = 1,795 PROTECTED PLANTS PER ACRE

Because only 25% of the total study area was sampled, an area conversion factor was applied to the raw data to obtain protected plant densities over the total 1.59 acres study area. To obtain

this estimate, raw data from all plant sampling quadrats were summarized and total values were multiplied by 4.0 to adjust for the sampling effort (Table 2).

Table 2. Estimated protected tree numbers in the area proposed for expansion at the KLWTD Mile Marker 100.5 facility. Because the total area sampled comprised only 25% of the total 1.59 acre study area, an area conversion factor of 4X was applied to estimate plant density over the 1.59 acre study area.

Species Code	Size	Quadrat Counts	Total Area Factor = 4X
GL	25	87	348
BI	25	44	176
PW	25	35	140
MH	25	34	136
TI	25	36	144
PP	25	26	104
IW	3	365	1460
JD	25	14	56
PL	25	14	56
BB	25	5	20
IW	7	18	72
PL	7	9	36
BI	10	4	16
BI	7	6	24
FC	25	2	8
WB	25	1	4
BI	3	12	48
IW	25	3	12
PL	10	4	16
BL	25	1	4
PL	3	1	4
TOTAL PROTECTED PLANTS			2,884

Protected Plant Size Class Distribution

The size class distribution of trees on the KLWTD study area was bi-modal; large numbers of trees were either very small or very large (Table 3). Typically, hardwood hammocks are skewed towards large trees comprising the overstory, with the smaller trees less common in the open understory typified by many of the more mature hardwood hammocks. A single tree species, Inkwood, had a significant affect on the statistical sampling of tree size class distribution on the KLWTD study area. Seedlings of this species occur in very high densities in certain areas of the study area (Figure 5).

Inkwood seedlings persist in the understory of hardwood hammocks patches in association with mature Inkwood trees which are typically widely dispersed. If a gap in the forest canopy opens as a result of disturbance or death of a canopy tree, the seedlings compete for light and attempt to colonize these light gaps. This phenomenon is well documented in tropical forests, and is referred to as the light gap dynamics model of canopy tree recruitment.

The sampling data suggests Inkwood is a dominant tree species in the hammock, comprising a total of 53 percent (N = 386) of all protected trees on the study area. However, only three adult trees greater than 10 feet in height were recorded on the seven quadrats sampled, suggesting Inkwood as a relatively uncommon tree in the forest. Removing Inkwood less than 10 feet in height from the dataset, a total of 338 trees were sampled, with three of those being Inkwood. Thus, excluding immature Inkwood from the analysis, Inkwood comprised 0.90 percent of the trees sampled. Thus, the presence of large numbers of Inkwood seedlings had a strong statistical effect on the data analysis, and tended to overestimate the abundance of this tree relative to it's representation in the overstory.

Table 3. Size class distribution of protected plants on the KLWTD study area. The number of plants in each size category regardless of species is shown along with the proportion (%) of total plants counted.

Size Class	Count	Percent of Total
3	378	52
7	33	5
10	8	1
25	302	42
TOTAL	721	100

MITIGATION PLAN

The Monroe County LDR's require that mitigation fees for the loss of protected vegetation are calculated "*in an amount sufficient to replace each removed plant or tree on a two to one (2:1) basis*". It is generally accepted that tree cost is not simply the cost of the tree, but also the costs associated with the purchase, transport, planting, and maintenance of that tree sufficient to ensure survival. Plant replacement costs for the KLWTD project were taken from the most recent list compiled by Monroe County dated August, 2005.

Using the field data collected on the 1.59 acre KLWTD site and the tree costs from Monroe County, the mitigation requirement for the 1.59 acres of hardwood hammock proposed for development was estimated based on the total number of protected trees proposed for removal, the estimated distribution of tree size classes on the study area, and the estimate tree replacement cost by size class (Table 4). Approximately 25% of the total 1.59 acre area was sampled using quadrats, so all protected plant densities were multiplied by four (4X) to compensate for the actual area proposed for development. In addition, mitigation is required on a two to one (2:1) basis, so the field data for plant density was doubled (2X) to achieve this multiplier (Table 4).

Table 4. Estimated mitigation costs for the proposed expansion of the KLWTD regional wastewater treatment facility. Because the total area sampled comprised only 25% of the total 1.59 acre study area, an area conversion factor of 4X was applied. In addition, the Monroe County land development regulations require mitigation at a rate of 2:1, so all plant abundance data were doubled. Plant replacement cost was taken from the most recent list compiled by Monroe County dated August, 2005.

Species	Size	Count	Area Factor = 4X	Mit. Factor = 2X	Cost / Tree	Cost
GL	25	87	348	696	$136.25	$94,830.00
BI	25	44	176	352	$200.00	$70,400.00
PW	25	35	140	280	$175.00	$49,000.00
MH	25	34	136	272	$149.75	$40,732.00
TI	25	36	144	288	$128.75	$37,080.00
PP	25	26	104	208	$166.50	$34,632.00
IW	3	365	1,460	2,920	$10.00	$29,200.00
JD	25	14	56	112	$167.74	$18,786.88
PL	25	14	56	112	$150.00	$16,800.00
BB	25	5	20	40	$250.00	$10,000.00
IW	7	18	72	144	$33.41	$4,811.04
PL	7	9	36	72	$50.00	$3,600.00
BI	10	4	16	32	$82.50	$2,640.00
BI	7	6	24	48	$50.00	$2,400.00
FC	25	2	8	16	$150.00	$2,400.00
WB	25	1	4	8	$183.87	$1,470.96
BI	3	12	48	96	$15.00	$1,440.00
IW	25	3	12	24	$55.00	$1,320.00
PL	10	4	16	32	$37.26	$1,192.32
BL	25	1	4	8	$120.00	$960.00
PL	3	1	4	8	$12.67	$101.36
			TOTALS			**$423,796.56**

Based on the above analysis, a total mitigation payment of **$ 423,796.56** will be required to offset unavoidable impacts to protected vegetation resulting from the proposed expansion of the KLWTD facility.

CONCLUSIONS

Using the sampling methodology detailed in the methods section of this report, a protected tree species density was estimated that is statistically representative of the distribution of the vegetation throughout the property. A statistical sampling technique is preferable to exhaustive sampling over the entire area due to the increased accuracy of sampling data over discrete quadrats and also obvious benefits in total sampling effort. Statistical sampling of vegetation is a standard practice in forestry where quantities of valuable forest products must be accurately and efficiently measured.

Protected plants are defined as plants that are listed as threatened, endangered, commercially exploited, and regionally important native plant species and all native trees with a DBH of greater than four inches. For the hardwood hammock habitat on the KLWTD, a density of approximately 1,795 protected plants per acre, was estimated. Adjusting for the sampling area, it is estimated that a total of 2.884 protected trees will be impacted by the proposed expansion of the KLWTD facility.

The mitigation plan for the proposed project was based on the plant sampling techniques described above. Using the field data and an estimate of plant replacement costs obtained from Monroe County, a total mitigation payment of **$ 423,796.56** will be required to offset unavoidable impacts to protected vegetation resulting from the proposed expansion of the KLWTD facility.

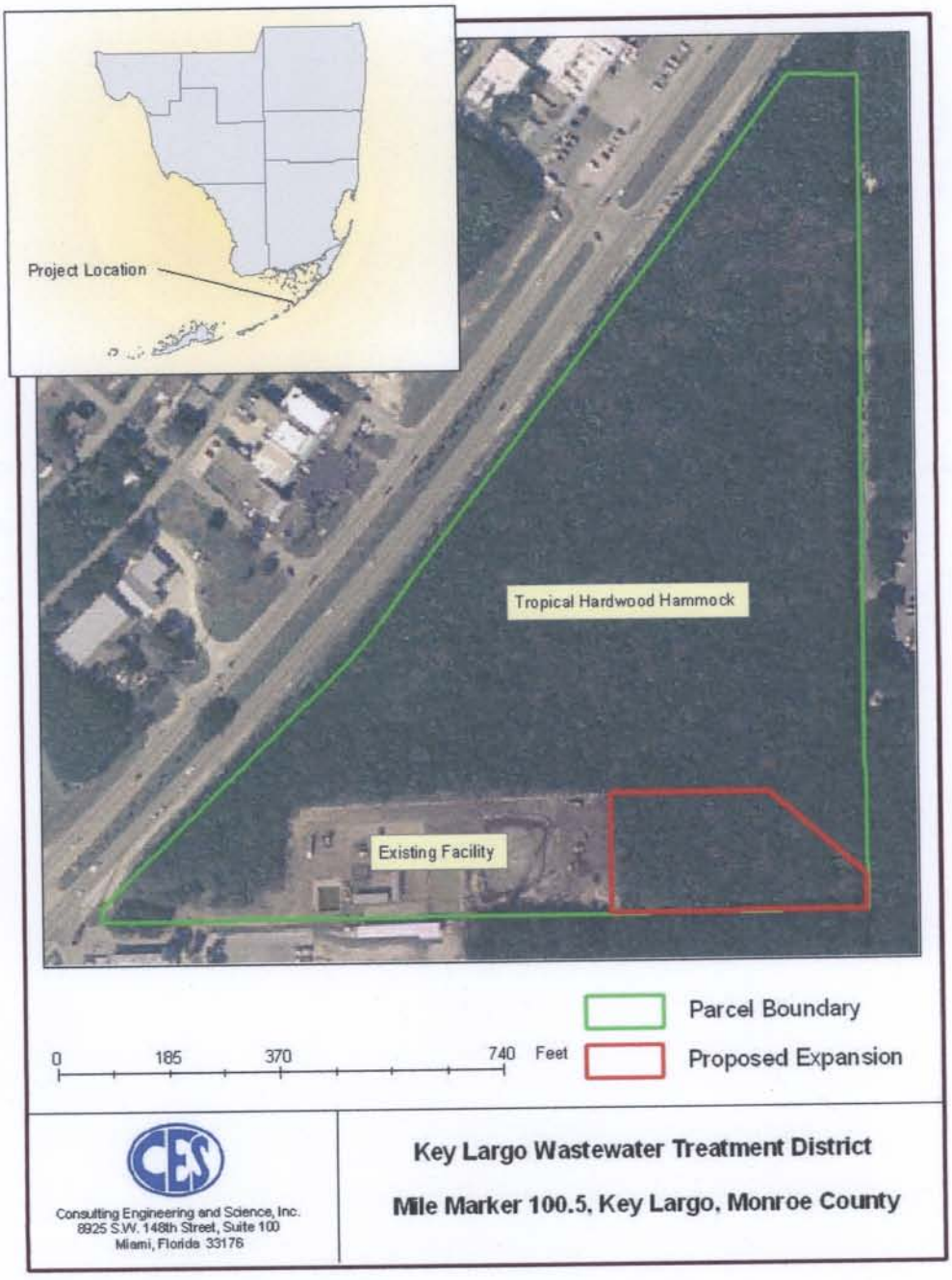


Figure 1. Location of the proposed expansion of the KLWTD wastewater treatment facility at Mile Marker 100.5, Key Largo.

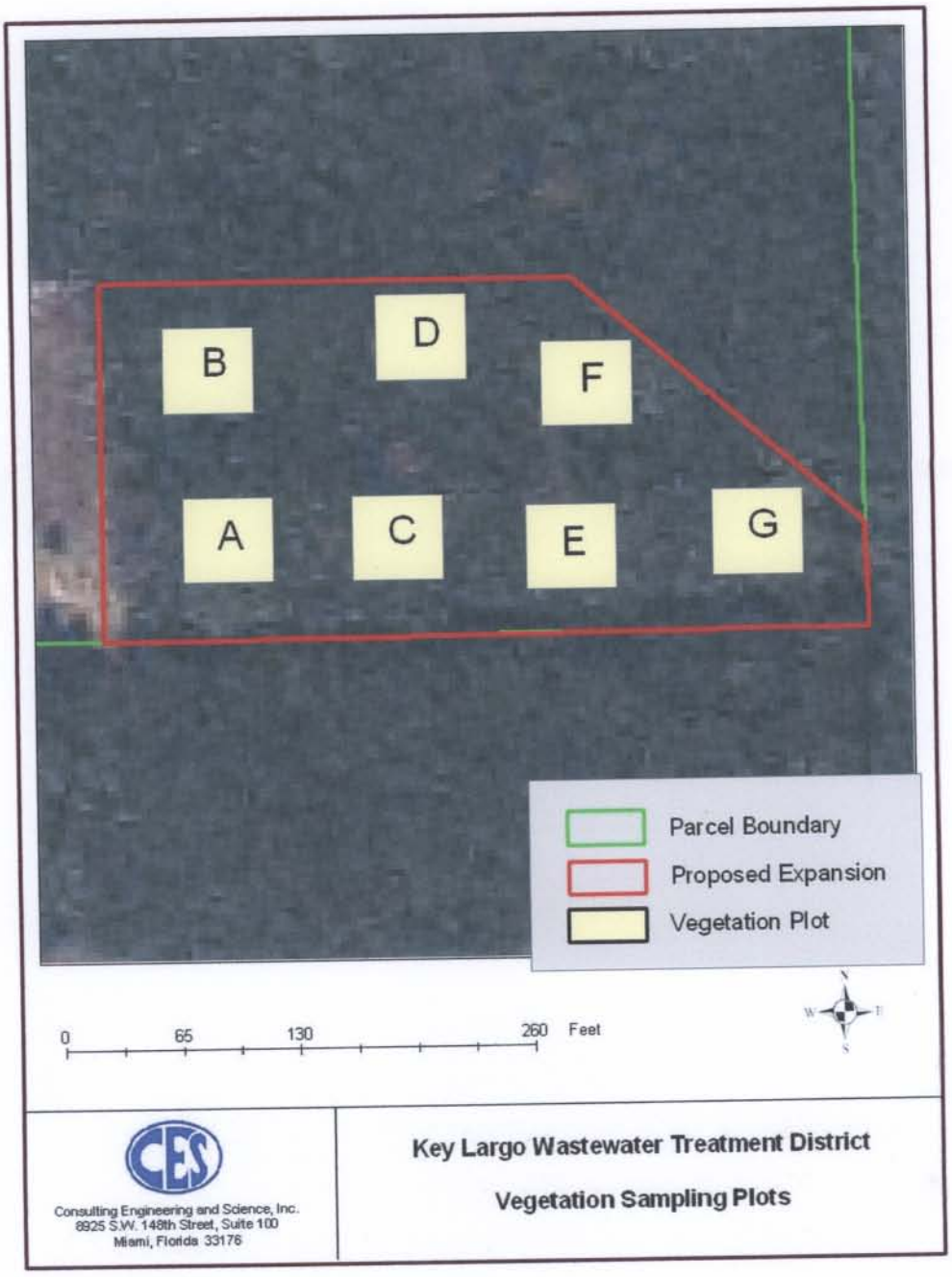


Figure 2. Location of the seven 2,500 square foot vegetation sampling plots on the KLWTD study area.

Figure 3. Typical hardwood hammock habitat on the KLWTD study area. This hardwood hammock has been rated as a high quality hammock using the Habitat Evaluation Index procedures in the Monroe County Land Development Regulations.

Figure 4. Photograph showing the un-paved access road that runs along the southern boundary of the KLWTD study area. The study area is located to the right side of the road in this photograph. The existing cleared area can be seen in the distance.

Figure 5. Photograph of Inkwood (*Exothea paniculata*) seedlings in the understory of the hardwood hammock on the KLWTD property. High-density inkwood seedling patches occur in association with mature Inkwood trees which are widely dispersed throughout the study area. The presence of these high-density Inkwood seedling patches had a strong statistical effect on the data analysis, and tended to overestimate the abundance of this tree relative to it's presence in the overstory.

Appendix 1. Protected plant data from the Key Large Wastewater Treatment District property, Mile Marker 100.5, Key Largo.

Plant species encountered on the KLWTD study area and their listed status. Listed status refers to a plants status as Endangered (E), Threatened (T), Commercially Exploited (CE), or Regionally Important (RI) as established by the Florida Department of Agriculture.

Common Name	Scientific Name	Field Code	Status
Black Ironwood	*Krugiodendron ferreum*	BI	RI
Blolly	*Guapira discolor*	BL	
Cinnamon bark	*Canella winterana*	CB	RI
Gumbo Limbo	*Bursera simaruba*	GL	
Inkwood	*Exothea paniculata*	IW	RI
Jamaica Caper	*Capparis cynophallophora*	JC	
Jamaica Dogwood	*Piscidia piscipula*	JD	
Limber Caper	*Capparis flexuosa*	LC	
Mahogany	*Swietenia mahogani*	MH	E
Marlberry	*Ardisia escallonioides*	MB	
Mouse's pineapple	*Morinda royoc*	MP	
Pale Lidflower	*Calyptranthes pallens*	PL	RI
Pigeon Plum	*Coccoloba diversifolia*	PP	
Poisonwood	*Metopium toxiferum*	PW	
Pull and hold back	*Pisonia aculeata*	PH	
Randia	*Randia aculeata*	RD	
Sapodilla	*Manilkara zapota*	SD	Exotic
Saffron Plum	*Bumelia celastrina*	SP	

Common Name	Scientific Name	Field Code	Status
Shortleaf Fig	*Ficus citrifolia*	FC	
Snowberry	*Chiococca alba*	SB	
Spanish Stopper	*Eugenia foetida*	SS	
Strongbark	*Bourreria ovata*	SB	
Torchwood	*Amyris elemifera*	TW	
White Stopper	*Eugenia axillaris*	WS	
Willow Bustic	*Dipholis salicifolia*	WB	
Wild Lime	*Zanthoxylum fagara*	WL	
Wild Coffee	*Psychotria nervosa*	WC	
Wild Tamarind	*Lysiloma latisiliquum*	WT	

Protected plant occurrence by individual vegetation sampling quadrats on the KLWTD study area. Plant data was collected on seven quadrats 2,500 sq. ft. in size, and data was collected from May 8-13, 2006.

PLOT	SPECIES FIELD CODE	Size Class	Count
A	BI	3	3
A	BI	25	11
A	FC	25	1
A	GL	25	11
A	IW	3	5
A	JD	25	3
A	MH	25	2
A	PL	25	5
A	PP	25	8
A	TI	25	8

PLOT	SPECIES FIELD CODE	Size Class	Count
A	WL	25	1
PLOT			
B	BI	7	4
B	BI	10	2
B	BI	25	2
B	GL	25	7
B	IW	3	2
B	JD	25	1
B	MH	25	4
B	PL	3	1
B	PL	7	9
B	PL	10	4
B	PL	25	9
B	PP	25	6
B	PW	25	5
B	TI	25	2
PLOT			
C	BB	25	4
C	BI	3	2
C	BI	25	7
C	GL	25	9
C	IW	3	8
C	IW	25	1
C	JD	25	3
C	MH	25	10
C	PP	25	3

PLOT	SPECIES FIELD CODE	Size Class	Count
C	PW	25	6
C	TI	25	7
PLOT			
D	BB	25	1
D	BI	3	4
D	BI	25	6
D	GL	25	16
D	IW	3	53
D	JD	25	1
D	MH	25	3
D	PP	25	6
D	PW	25	6
D	TI	25	5
PLOT			
E	BI	25	4
E	FC	25	1
E	GL	25	17
E	IW	3	126
E	IW	7	9
E	IW	25	1
E	MH	25	2
E	PW	25	11
E	TI	25	3
PLOT			
F	BI	3	1
F	BI	7	1

PLOT	SPECIES FIELD CODE	Size Class	Count
F	BI	10	2
F	BI	25	9
F	GL	25	15
F	IW	3	3
F	IW	7	1
F	JD	25	4
F	MH	25	5
F	PP	25	2
F	PW	25	4
F	TI	25	8
F	WB	25	1
PLOT			
G	BI	3	2
G	BI	7	1
G	BI	25	5
G	BL	25	1
G	GL	25	12
G	IW	3	168
G	IW	7	8
G	IW	25	1
G	JD	25	2
G	MH	25	8
G	PP	25	1
G	PW	25	3
G	TI	25	3